

**CLIMATE CHANGE, URBAN DEGREENING AND FLOODING IN NIGERIAN CITIES:  
REDUCING VULNERABILITY THROUGH POLYCENTRIC PLANNING AND URBAN  
GREENERY STRATEGY (PPUGS)**

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**ABSTRACT**

This paper uses the Institutional Analysis and Development (IAD) framework to analyse the missing links in attempts to address the problems of flooding in Nigerian cities. Previous flooding and the recent ones have been attributed to heavy downpour, blockage of water channels and drainages, indiscriminate dumping of refuse and building of houses along channels. Areas that are neglected but pertinent to flood mitigation include: (1) degreening activities that remove green cover; (2) paving of open spaces with asphalt and concrete that accentuate storm water volume as percolation is reduced; and (3) unpaved surfaces that generate debris and silts that cause siltation and sedimentation of Atlantic Ocean and Lagoon with the consequence of rising sea level and coastal flooding. The paper reports the findings of longitudinal studies on causative factors of urban flooding. The studies commenced in Ile-Ife and Ibadan in 1997, conducted in Lagos in 1998-2000 and 2011 and in Ibadan in 2011 and 2012.

The paper identified gaps between and among the stakeholders in environmentalism and ecosystemic balance at state and local levels. Indications from Ile-Ife, Lagos and Ibadan show that the three cities are experiencing degreening activities. For example, in Ile-Ife and Lagos, the green areas account for the least proportions, 24.1% and 27% of open spaces around buildings respectively, while 75.9% and 73.0% of the available open spaces are either paved or unpaved with the problem of heat radiation that demands additional energy for operating artificial cooling system and consequently increased global warming. In addition, degreening activities cause flooding. As more and more land is urbanised, and trees and grasses are replaced by asphalt and concrete, rainwater has less chance to be absorbed. Thus, storm water rushes down the streets while areas that were never flooded are now routinely under water.

Other studies in Lagos show that: (i) there is an increase in the rate of sedimentation and sea level rise (ii) rainstorms in the city have become more intense and urban flooding will be more severe. Floods have devastated many parts of Lagos and Ibadan leading to loss of several lives and property and the displacement of several people. Statistics confirms that between 2011 and 2012, more than 150 billion naira (about \$1 billion) was lost in Lagos, while 2,105 buildings were flooded

in Ibadan with property damaged estimated in billions of Naira. As a result, the Lagos and Oyo States' Governments spent several millions of Naira on relief to the victims.

This paper raises some fundamental questions on the roles of stakeholders (scholars, public officials, practitioners, professionals and citizens) within the built environment in designing strategies at mitigating urban flooding. This paper considered it imperative for the adoption of pragmatic and problem-solving strategies that can help in mitigating flooding in Lagos and Ibadan. Consequently, the paper designs an African Polycentric Urban Greenery Model (APUGM) that can be applied to addressing the challenges of flooding in the two cities. The paper emphasizes, among other considerations, the use of traducture in reaching the grassroots for solution to the recurrent challenges of flooding. The paper also designs strategies that Lagos and Oyo states' governments could adopt for the depopulation of the two cities – Lagos and Ibadan respectively through de-urbanisation, de-migration and re-migration.

## INTRODUCTION

*“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.” – Richard Buckminster Fuller*

All around us today there is a clear evidence of environmental change due to buildup of earth warming gasses that induce climate change. Among the most important of these changes is the buildup of carbon dioxide and methane which is a result of human activities through fossil fuel and tropical deforestation (Geist and Lambin, 2001; Moran, 2005:3). Forests in North and South America, Africa and Asia have undergone cycles of slash-and-burn activity that only became destructive and unproductive when fallows were shortened due to high population pressure and natural restoration was not allowed to complete an adequate cycle of regrowth of secondary vegetation (Williams, 2003).

The global concerns for environmental protection, poverty alleviation and sustainable development stem out of the fact of the disparity or incongruence between population growth (at geometric rate) and resources development (at arithmetic rate). The magnitude and tempo of degradation of the earth’s surface has intensified due to increase in the drives for technological advancement, civilisation and economic development that legitimately demand the mining and burning of fossil fuels, the destruction of forests and agricultural land for highways and industries, and the release of effluents from industrial and agricultural processes. However, uncontrolled and unregulated drives to fulfil these developmental agenda result in the release of large quantities of “greenhouse” gasses into the atmosphere. Invariably, environmental degradation is intricately linked with poverty as industrial impacts represent socio-economic sponges that soak the welfare of people at local level (Geist and Lambin, 2001, 2004; Williams, 2003; Seto and Kaufmann, 2003; McConnel and Keys, 2005). Recent study shows that rising air temperatures in the Arctic region have made the region to be warming more rapidly than anywhere else on earth (UWN, 2011). This makes the ice more susceptible to melting and rising sea level.

According to the latest estimates, the entire African continent was responsible for only 3.7% of the world’s annual CO<sub>2</sub> emissions, compared to China with 21.5%, the United States with 20%, and the European Union with 14%. This is in spite of the fact that African forests take in 20% of carbon absorbed by trees across the world (Minter and Wheeler, 2009). From 1980 to 2005, sub-Saharan Africa had 18.5 per cent of the world’s population growth but its share in the growth of CO<sub>2</sub> emissions was just 2.5 per cent. The United States and Canada had 4 per cent of the world’s population growth but its share in the growth of CO<sub>2</sub> emissions was 13.9 per cent. China had 15.3 per cent of the world’s population growth and 44.5 per cent of the growth in CO<sub>2</sub> emissions. And this actually understates the contributions of high-income nations (Satterthwaite, 2009).

If this is the case, then there is the need for cooperation and collective action among global development players. The theories of collective action suggest that individuals under certain institutional arrangements and shared norms are capable of organizing and sustaining cooperation that advances the common interest of the group in which they belong (Elinor Ostrom, 1990). This line of thought recognizes that human beings can organize and govern themselves based on appropriate institutional arrangements and mutual agreements in a community of understanding. This is the fundamental of the Institutional Analysis and Development (IAD) framework.

The IAD believes in institutional arrangement designed by people who cooperate based on rules and constitution of their choice, and thereby are able to resolve socio-economic and technological problems which other people (external to their conditions) are not capable of doing for them. Since society is a system of human cooperation, people in any society should collectively relate to and deal with their exogenous variables. Exogenous variables are those conditions that affect human livelihoods and which humans have to work upon through appropriate planning and institutional arrangements to better their conditions of existence. However, there are some fundamental imperatives of collective action within development arena. These are collegiality,

mutual trust, reciprocity and shared community of understanding. It is the realization of these imperatives through constitutional reforms, effective planning and institutional arrangements that can enable leaders and the people to work together to achieve meaningful progress. We should all be concerned with the protection of the environment and ecosystemic balance, hence the collective drive for environmentalism. Environmentalism is a broad philosophy and social movement regarding concerns for environmental conservation and improvement of the state of the environment.

The causes of flooding in Nigerian cities and Lagos Metropolis in particular can be traced to: (1) ineffective waste management that blocks drains; (2) erection of structures on waterways; (3) over-stretched, or non-existent sanitation drainage, etc; (4) degreening activities that remove green cover; (5) paving of open spaces with asphalt and concrete that accentuate storm water volume as percolation is reduced; and (6) unpaved surfaces that generate debris and silts that cause siltation and sedimentation of Atlantic ocean and lagoon with the consequence of rising sea level and coastal flooding. While numbers 1-3 have attracted the attention of scholars and policy makers, numbers 4-6 are neglected or unrecognised as important agents of flooding.

For example, Simpson (2006) observes the anti-environmental friendly practices of waste disposal that emphasizes the highly noticeable presence of non-biodegradable food wrappers that have replaced the bio-degradable ones in Lagos. Awosika (2000) shows that flooding of Victoria and Ikoyi Islands predominantly occurs during the rainy season, May to October and is more serious when rains coincide with astronomical high tides. The problems associated with the eight major drainage channels include: (i) clogging of the drainage channels by domestic waste and blocking of some channels by buildings; (ii) low gradient of the channels and variable channel width from head to outfall; (iii) collapsed drainage channel walls; (iv) reverse gradients in most channels such that when heavy rains coincide with high tides, tidal waters flow back into the channels through the outlets causing excessive flooding; (v) few people are well prepared to tackle the problems; (vi) the drainage channels are ineffective because they were either blocked by sand or refuse; and (vii) refuse containers are inadequate leading to dumping of refuse in the drainage canals by residents.

This paper uses the IAD framework to analyse the missing links between and among the stakeholders in environmental and ecosystemic balance at state and local levels in Lagos State. The paper found that climate change challenges confronting Lagos State have assumed dramatic proportions simply because governance structures and decision making systems are in two parallel layers – governments and the people. While state and local governments operate on one layer, the people operate on the other layer. This is a reflection of dysfunctional environmental governance structures in Nigeria and Africa (see Akinola 2010a, 2011a).

Lagos and Ile-Ife are experiencing degreening activities as indicated by very low proportions (27% and 24% respectively) of open spaces around buildings that are greened, while 73% and 76% of the available open spaces are either paved or unpaved with the problem of heat radiation, flood accentuation and generation of erosion that induced flooding. This confirms that the value of environmental health and beauty is being traded with economic considerations regardless of the fact that the loss in environmental value, health and beauty can offset the economic gains derived from degreening Akinola (2000b).

This paper raises five fundamental questions on the roles of stakeholders (scholars, policy makers, public officials, practitioners, professionals and citizens) within the built environment in designing strategies at mitigating environmental degradation and flooding in Lagos State. The questions are: (1) What role are (should) Nigerian scholars playing (play) in mitigating environmental degradation? (2) What strategies are (should) engineers adopting (adopt) in reducing environmental degradation in housing, road construction, industrialization, etc.? (3) What strategies are (should) professionals within the built environment adopting (adopt) in mitigating environmental degradation in both rural and urban environment? (4) What strategies are (should) public officials adopting (adopt) to enforce Corporate Social Responsibility at national, State and Local levels in

Nigeria and Lagos State? (5) What strategies should all lovers of mother earth put in place to ensure environmental sustainability and healthy environment for citizens in Nigeria and Lagos State?

This paper further argues that environmental governance is a priority for Nigerian and Lagos State Governments. The Federal Government should be involved in this exercise because Lagos, as a coastal city, is at the receiving end of debris from the hinterlands (through erosion and rivers) that are deposited in the Atlantic Ocean and Lagoon, which causes siltation and sedimentation and consequently, rising sea level. In other words, other parts of the country are also contributing to rising sea level and coastal flooding in Lagos State. Urban managers both at the State and Local Government Levels in Lagos must be ready to adopt more realistic and pragmatic strategies at addressing the current urban flooding challenges.

The point of departure of this paper, therefore, is in problem solving and solution seeking. Using Polycentric Governance and Urban Greenery Strategy (PGUGryS), this paper charts possible courses of actions that Lagos and Oyo State's Governments could take in addressing environmental degradation and the challenges of flooding in the State. Consequently, in order to mitigate flooding in Lagos and Ibadan, the paper designs and adopts three problem-solving and pragmatic models: (1) African Polycentric Urban Greenery Model (APUGryM), (2) African Polycentric Sustainable Environment Model and (3) (ASEM) African Polycentric Forest Management Model (APFMM). In addition, the Lagos State Government could embark upon depopulation of the city through de-urbanisation, polycentric privatization, de-migration and re-migration.

The paper is divided into six parts. The first part is the introduction, while the second part discusses the problematic of urbanization, urban degreening and flooding. The third section presents the theoretical underpinning upon which the paper is anchored, while the fourth part discusses the implications of degreening and consequent disaster in Lagos and Ibadan. The fifth section contains the strategies for mitigating flooding through effective greening strategy and depopulation of Lagos. The conclusion is drawn in the sixth part.

## **Methodology**

The longitudinal studies on causative factors of urban flooding commenced in Ile-Ife and Ibadan in 1997, conducted in Lagos in 1998-2000 and 2011 and in Ibadan in 2011 and 2012. The methodology adopted for the study included both primary and secondary methods. Primary data involved measurement, personal observation and oral interview. Fieldworks were carried out on sampled urban roads in hierarchical order - major, distributor and access roads. The exercise was conducted in two stages. The first stage dealt with the inventory of between 10 and 50 houses (depending on the length of roads) on the three types of roads reflecting the conditions of open spaces around the houses - green, paved and unpaved. A total of 264 houses were covered in the three local government areas in Lagos – Gbagada, Ikeja and Mushin LGAs. Measurements were carried out within the sampled plots on certain established parameters and these are: (i) The total area of the plot developed for physical structures; (ii) The total area of open space - greened, paved and unpaved spaces; Investigation was also conducted on reasons the respondents plant trees, flowers and grasses within their premises and the types of trees planted. *Agala* forest in Ibadan was surveyed to ascertain the level of deforestation. Secondary data consist of literature review on the subject matter.

## **THE PROBLEMATICS: URBANISATION, URBAN DEGREENING AND FLOODING**

Urban populations in Africa are growing at 3.6 percent per year (the highest among world regions) (United Nations 1994:27; Cohen 2004:28). This rapid change has vast implications both for human well-being and for the environment. Lagos is the only sub-Saharan African urban agglomeration to make the UN list of the 30 largest urban agglomerations in the world (Cohen 2004:44) with 8.7 million people (United Nations 2002). Urbanisation is at the expense of agricultural land and forest which are basically green cover. Population growth, technological and

social hazards, and environmental degradation have all to be taken into consideration today by policy-makers, resource planners, and administrators who make decisions about the land.

Some of the features of urbanisation include concentration of people and structures. The erection of these structures - houses, roads, rail airport etc. - suggests deforestation and replacement of green cover (tree, shrub and grass) by concrete, asphalt and steel. These elements are known for heat conduction, radiation and reflection which increase the ambient temperature, thus creating discomfort, inconvenience, inefficiency and low productivity. The result of this is the introduction of artificial cooling system - air conditioner. The use of air conditioner implies additional demand on electricity supply which invariably means increasing the capacity of hydro-power and thermal stations by constructing new types and expanding existing ones. Increasing the capacity of electricity supply has degradation potentials in the sense that the construction of dam for hydro-electricity leads to deforestation and global warming.

As more and more land is urbanised, and trees and grasses are replaced by asphalt and concrete, rainwater has less chance to be absorbed. Thus, storm water rushes down streets while areas that were never flooded are now routinely under water. For example, Ogunpa flood in Ibadan, the largest city in Nigeria, is a routine exercise and probably the highest cases of flood disaster in Nigeria. In April, 1978 in Ibadan, 32 dead bodies were recovered and in August, 1980 more than 150 people died and about 50,000 became homeless due to flood (Egunjobi, 1986).

In West Africa, in 2010, the number of people that died due to flooding was highest in Nigeria with 118, followed by Ghana (52), Sudan (50), Benin (43), Chad (24), Mauritania (21), Burkina Faso (16), Cameroon (13), Gambia (12), with other countries reporting less than 10 dead. About 1.5 million people with most of them in Benin (360,000), followed by Nigeria (300,000), Niger (226,611), Chad (150,000), Burkina Faso (105,481), Sudan (74,970) and Mauritania (50,815). Other countries had less than 50,000 people suffering from the floods. The effect of flooding was cholera epidemics with 1,182 people dead in Nigeria, while Cameroon, Niger and Chad followed (UN Office for the Coordination of Humanitarian Affairs (OCHA 2010).

The casualty for 2011 and 2012 in Nigeria is terribly high. The floods, which started in August, 2012 was caused by torrential rainfall and the release of excess waters from Lagdo Dam in Cameroon as well as Kainji and Shiroro dams in Nigeria, which caused the Niger and Benue rivers to overflow their banks. As a result, several hectares of farmlands for food and cash crops like cassava, rice, groundnut, cocoa, beans, vegetables, Irish potatoes, pepper, tomatoes, plantain, banana, millet, cotton, melon and many other agricultural produce, including livestock and fishery, have been destroyed by the rampaging flood. For example, not less than 13,300 hectares of rice plantation across Nigeria were washed away by the ravaging floods. Many of the farmers whose farmlands were affected are indebted to banks from which they obtained loans to invest in the farms in expectation of bumper harvest. Analysis confirms that the future is bleak for agriculture sector, a sector that contributes 42 per cent to the GDP, and employs over 70 per cent of the population. Several roads, bridges, schools, health centres and other infrastructures have been submerged in the floods. Already the nation is losing about \$43 million (N6.8 billion) daily to production cutback on account of the devastating flood, a decline by 18 per cent from 2.6 million barrels per day (Eni, 2012).

Statistics from National Emergency Management Agency (NEMA) indicates that about 30 of the 36 States of Nigeria were affected and they are: Lagos, Plateau, Borno, Nassarawa, Bauchi, Gombe, Jigawa, Katsina, Kebbi, Taraba, Adamawa, Benue, Niger, Kaduna, Kano, Kogi, Akwa Ibom, Imo, Delta, Edo, Ebonyi, Bayelsa, Cross River, Rivers, etc. Some 1.3 million Nigerians have been displaced and estimated 1,555 persons died from 2010 to 2012. The Federal Government has announced the release of ₦17.6 billion to aid the affected States (Dyikuk, 2012; Mordi 2011).

The results of attitudinal study conducted in Abuja in December 2000 show that the majority of the respondents (37.7%) greened their environment for beautification; 32.6% did the same in order

to be closer to nature; 15.3% for preventing erosion; 13.0% for providing shade while 1.4% planted green covers on the ground that green covers release oxygen to their surroundings (Akinola 2000b).

When large proportion of urban open spaces are not greened as in the case of Lagos with 73%, rain water carries debris and silts into the ocean and lagoon and, thus causing siltation and sedimentation. The displaced water tends to cause coastal erosion and deforestation. This position is reinforced by the findings of the Nigerian Institute for Oceanography and Marine Research which show that annual erosion rates of 25 – 30 cm. between 1981 and 1985 occurred at Lagos bar beach (see Awosika and Folorunso<sup>1</sup> (2000). With erosion links to siltation and sedimentation of sea bed, the recurrent flooding in Lagos is strongly connected with degreening activities in the state. In addition, Folorunso and Awosika (2001) related flooding in Lagos to clogging of drainage channels by dumped solid wastes. The recent flooding in Lagos State is directly linked to the factors discussed above. According to ThisDay Newspaper (15 July 2011), virtually all parts of Lagos State were flooded, forcing residents to stay indoors.

Unless open green spaces are provided and maintained, urban areas are vulnerable to the destructive impact of flood. Urganhart (1977) described a balanced urban landscape as the total urban pieces - buildings, communication network and open spaces. If open spaces are not greened in urban areas, they will either be paved or left opened, a situation which has great consequences. For instance, paved spaces reflect heat which consequently, increase environmental temperature. Unpaved surfaces are opened to erosional effect during the rainy season and agent of air pollution (dust) during the dry season. This brings to mind, the effect of sand digging around Lagos by some construction industries. Sand digging causes deforestation that takes a very longer period for natural re-afforestation.

Green space serves several purposes especially in urban areas. Such purposes include: local climatic regulation; cycling of water; cycling of oxygen, carbon dioxide and nitrogen; biological filtering of pollutants and screening from noise; regulating hydrology and run-off; recreation, amenity and public health. Considering the benefits of green cover, urban greenery is a short-cut to reduction of environmental degradation; increase in productivity and welfare of citizens and aesthetic value; and a short-cut to sustainable development. This is realisable when we operate within a balanced ecological system.

The relationship between the physical structures and green cover should be balanced considering the tremendous role of green cover (forests). It is necessary, in this regard, to draw attention to the Paris Declaration, which was issued at the end of the Tenth World Forestry Congress (1991) which called on the world's decision-makers to raise awareness and inform the public so that forest issues could be better understood and appreciated. All congresses since then have emphasised the need to involve the people in forest policy development. The requirements for sustainable forest management include not only the involvement of the people but also the availability of appropriate techniques and adequate finance. Forests, whether in the rural area or within the city, serve the same purpose i.e. environmental health.

Forestry is a renewable resource. However, if it is misused and depleted badly, the process of its replenishment can be extremely long and painful as in the case of Britain (Kula, 1992:61). The activities of man seem to dominate those of other components of the environment, whereas "in the order of existence, humanity is a late comer to the natural environment" (Brenda, 1948:9). The interplay between the two actors (man and environment) suggests that lack of planning and/or unchecked manipulation of the environment may lead to self-defeating of human race in totality.

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<sup>1</sup> Note: Drs. Awosika, L. and R. Folorunso are staff of the Nigeria Institute for Oceanography and Marine Research, Victoria Island, Lagos.



Forests perform several functions to man and environment in various ways. They perform irreplaceable ecological services as well as provision of economic products and recreation. They assist in the global cycling of water, oxygen, carbon dioxide and nitrogen. Forests stabilise hydrological systems; reduce the severity of floods and regulate re-charge of springs, streams, and underground waters. Trees protect the soil on slopes and keep sand from blowing off deserts; they prevent sedimentation of rivers and reservoirs, and when properly placed, help hold topsoil on agricultural land. Forests house millions of plant and animal species that will disappear if forests are destroyed (Oseni 1986).

Considering the negative impact of deforestation in the hinterland of cities, it is high time most of the available open spaces within cities were greened. The quality and quantity of green open spaces in an urban center reflects the overall attitude, socio-economic well being and needs of the urban society. Misuse or neglect of open spaces not only result in general physical confusion, chaotic scenes, but also creates health hazards, environmental pollution and above all, a general lowering of community spirit and aspirations. If forests are disappearing, it is important for policy makers to make conscious efforts at initiating and enforcing tree planting within urban areas. Urban areas because of the conglomeration of steels, asphalt and concrete temperature is generally higher than in the ruralscape. This is the reason why an appreciable proportion of open space within urban centers should be greened to reduce the already high temperature.

According to Akinola (2000b), the sampled local government areas in Lagos are experiencing degreening activities. The green areas account for the least proportion (about 27%) of open spaces around buildings, while 73.0% of the available open spaces are either paved or unpaved with the problem of heat radiation. The findings of another study conducted in Ile-Ife in 1997 shows that green areas account for the least proportion (about 24%) of open space. This has an implication of increasing the ambient temperature with the effect of increasing the cost of artificial cooling system.

When large proportion of urban open spaces are not greened as in the case of Lagos with 73%, rain water carries debris and silts into the ocean causing siltation and sedimentation of ocean. The displaced water tends to cause coastal erosion and deforestation. That is why this paper identifies degreening activities as gaps and neglected areas by researchers and policy makers in attempts to address the problems of flooding in Lagos State. For instance, previous and current studies and works have focused more on efficient drainage system and effective waste management (which is good) while other critical areas such as adequate greening and appropriate paving are neglected. Previous flooding and the recent ones have been attributed to heavy downpour, blockage of water channels and drainages, indiscriminate dumping of refuse and building of houses along channels. In spite of the efforts of LAWMA, some people still dump waste in drainage. What could have accounted for this?

Areas that are neglected but pertinent to flood mitigation include: (1) degreening activities that remove green cover; (2) paving of open spaces with asphalt and concrete that accentuate storm water volume as percolation is reduced; and (3) unpaved surfaces that generate debris and silts that cause siltation and sedimentation of Atlantic Ocean and Lagoon with the consequence of rising sea level and coastal flooding. This argument finds immense support from the findings of the Nigeria Institute for Oceanography and Marine Research that states that annual erosion rates of 25–30 cm between 1981 and 1985 occurred at Lagos bar beach (Awosika and Folorunso<sup>2</sup> 2000). Therefore, recurrent flooding in Lagos may not be unconnected with degreening activities.

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<sup>2</sup> Note: Drs. Awosika, L. and R. Folorunso are staff of the Nigeria Institute for Oceanography and Marine Research, Victoria Island, Lagos.

## **THEORETICAL UNDERPINNING**

The theories of collective action suggest that individuals under certain institutional arrangements and shared norms are capable of organizing and sustaining cooperation that advances the common interest of the group in which they belong (E. Ostrom, 1990). This line of thought recognizes that human beings can organize and govern themselves based on appropriate institutional arrangements and mutual agreements in a community of understanding. This is the fundamental of the Institutional Analysis and Development (IAD) framework. The IAD believes in institutional arrangement designed by people who cooperate based on rules and constitution of their choice, and thereby are able to resolve socio-economic and political problems which other people (external to their conditions) are not capable of doing for them. Since society is a system of human cooperation, people in any society should collectively relate to and deal with their exogenous variables.

The IAD considers the role of evolution, culture, learning and social norms in the discourse on collective action (E. Ostrom and Walker, 2003). Institutional structures that people have developed over the years avail individuals in the community to make inputs to development in their locality by contributing towards projects (labour, finance and materials) and decision-making in political arenas in rural settings. According to Sawyer (2005:3), institutional analysis helps us to better understand how individuals within communities, organizations and societies craft rules and organize the rule-ordered relationships in which they live their lives. To understand institutions, according to E. Ostrom (2005:3), one needs to know what they are, how and why they are crafted and sustained, and what consequences they generate in diverse settings. Understanding institutions is a process of learning what they do, how and why they work, how to create or modify them, and eventually how to convey that knowledge to others.

The debate on management of natural resources has polarized into private and state ownerships. While private ownership promises efficiency but often at the cost of community and democratic values, state ownership claims to address these values but often at the cost of efficiency, as bureaucracy takes its inevitable toll by destroying community and self-governing values. The third sector, which is the self-governing sector, focuses on common-property ownership by voluntary associations of local users. Abundance evidence confirm that local people, through self-governing institutions, can handle complex social and economic issues successfully and equitably sometimes for hundreds of years (Hawkins 1992:xi).

The commons is like a factory that produces, not a series of differentiated products, but a stream of pool of undifferentiated “product” from which individuals take a portion for their use – hence the term “common-pool resource” (CPR), or “the commons.” Without coordination, individuals may in the aggregate use too much too fast, causing the rate of production to fall. Sharing without collective consumption – the commons situation – requires restraint, which in turn depends on coordination among users. Otherwise, individuals continue to consume without regard to the diminishing marginal product of the commons as a whole (Oakerson 1992:42). If a community of users is unable to work through existing arrangements to respond appropriately to changes, destructive competition or conflict may follow. Resource depletion (or degradation of facilities) results – the “tragedy of the commons.” In specific cases, the consequences may be soil erosion, overgrazing, impassable roads, diminishing fish harvests, disappearing species, shrinking forests, reduction in quantity of oil, etc.

From Tunis to Cape Town and from Cape Verde to Comoros, collective action or self-help or voluntary efforts in Africa underlining by self-governing values have produced lasting impact among participants. It has been confirmed that community institutions in Africa possessed self-organizing capabilities through which community members relate with one another in a rule-ordered relationship, sharing ideas, and using their own initiatives and institutional potentials to address problems of daily existence. Examples of local people’s provision of public goods using available social capital (associations) are well documented throughout African continent (Smock 1971; Olowu,

Ayo and Akande 1991; McGaffey 1992; Barkan, McNulty and Ayeni 1991; IDS 2001; Okotoni and Akinola 1996; Akinola 2000a; 2003a; 2004; 2005d; 2007a,f, 2008b, 2009a,b, 2010a,g,i, 2011a,b,c). This self-governing arrangement empowers citizens, protects individual choice and allows for polycentric institutional arrangement that permits citizens to join with one another to take collective action (Wunsch and Olowu 1995:274). These patterns of self-organising and self-governing capabilities of the local people in resolving their daily challenges are described as polycentricity.

For example, in 1999, a survey conducted in Olaleye and Iponri communities, Lagos Mainland local government area (LGA) showed that the projects embarked upon by the institutions, no doubt, have increased the level of access of the people to infrastructure facilities. The two communities spent ₦615,000.00 on socio-economic projects between 1983 and 1997, while some ₦455,000.00 was contributed towards the same projects by Nigerian government, World Bank and other international donors. Thus, community development efforts constituted the prime mover (60.0%) of the community development (Akinola and Akutson, 2001; Akinola, 2009a).

These examples provide a basis for better understanding of how to identify and build upon local initiatives that are likely to improve water and sanitation services. Local people have been able to consider various possible alternatives to many current coping and management strategies, especially revitalizing public dialogue that has been missing for many years. Meetings and community gatherings are important opportunities for people to voice their opinions in public. This is instructive for the formation of self-governing community assembly in African cities (Akinola 2010a,i, 2011a).

It is only at this level of common pool resources that some achievements have been realized. This is the doctrine of polycentricity which provides alternative strategies to address problems of daily existence at the grassroots level in the face of dismal performance of the modern state institutions. The concern is that if these institutions are so accountable to their members, we should begin to conceptualize how they can be used to re-constitute socio-economic and political order from the bottom-up and to serve as alternatives and/or complementarities to the modern state institutions. In order to reconstruct the public sphere and democratise environmentalism in Nigeria, an important task that needs to be accomplished is to build on the existing self-governing structures in the country (Akinola 2011a:34-36), especially in Lagos State to work together on urban governance and urban greenery.

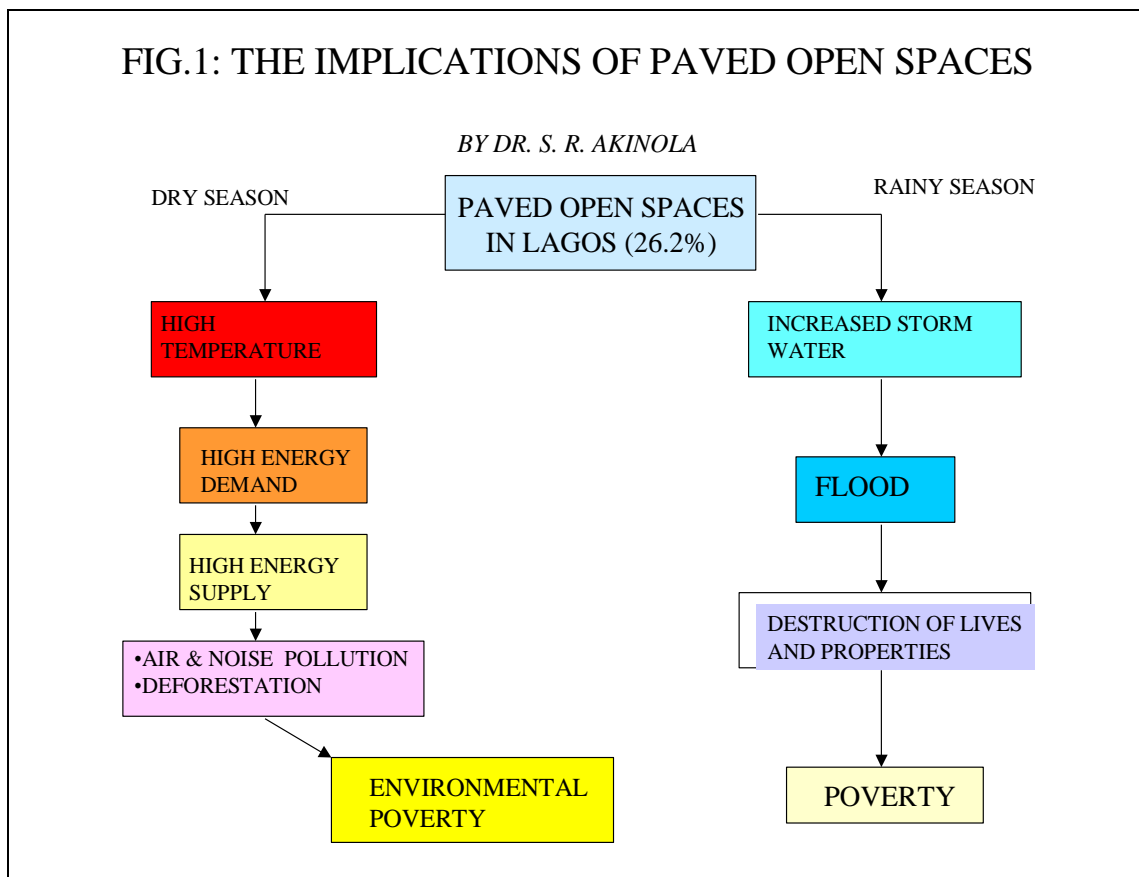
For example, Brazil and Indonesia, which had the highest loss of forests in the 1990s, have significantly reduced their deforestation rates. Similarly, ambitious tree planting programmes in countries such as China, India, the United States and Viet Nam – combined with natural expansion of forests in some regions – have added more than 7 million hectares of new forests annually (FAO 2010). Forests conservation is one of the strategies to achieve environmental sustainability, an important commitment to the Millennium Development Goals (MDGs), which is an internationally recognised blueprint to alleviate poverty by 2015 (FAO 2010). Since deforestation has global consequences, then Nigeria should embark on a forestation programmes both in rural and urban settings to complement the efforts of other nations so that globally we can all have a healthy environment to live in.

If we share with the collective action theories and CPR principles that institutions matter in terms of their influence on cooperation, then the problem of degreening and clogging of drainage in Lagos State can be addressed if appropriate institutional arrangements are put in place. If such institutional arrangements can produce four fundamental imperatives of collective action – collegiality, mutual trust, reciprocity and shared community of understanding – then it is possible for Lagosians (leadership and the people at community/local level) to cooperate, especially when they perceive that the outcome of the interactions will be beneficial to them all. The problems and challenges discussed above have remained with us and are likely to remain until appropriate

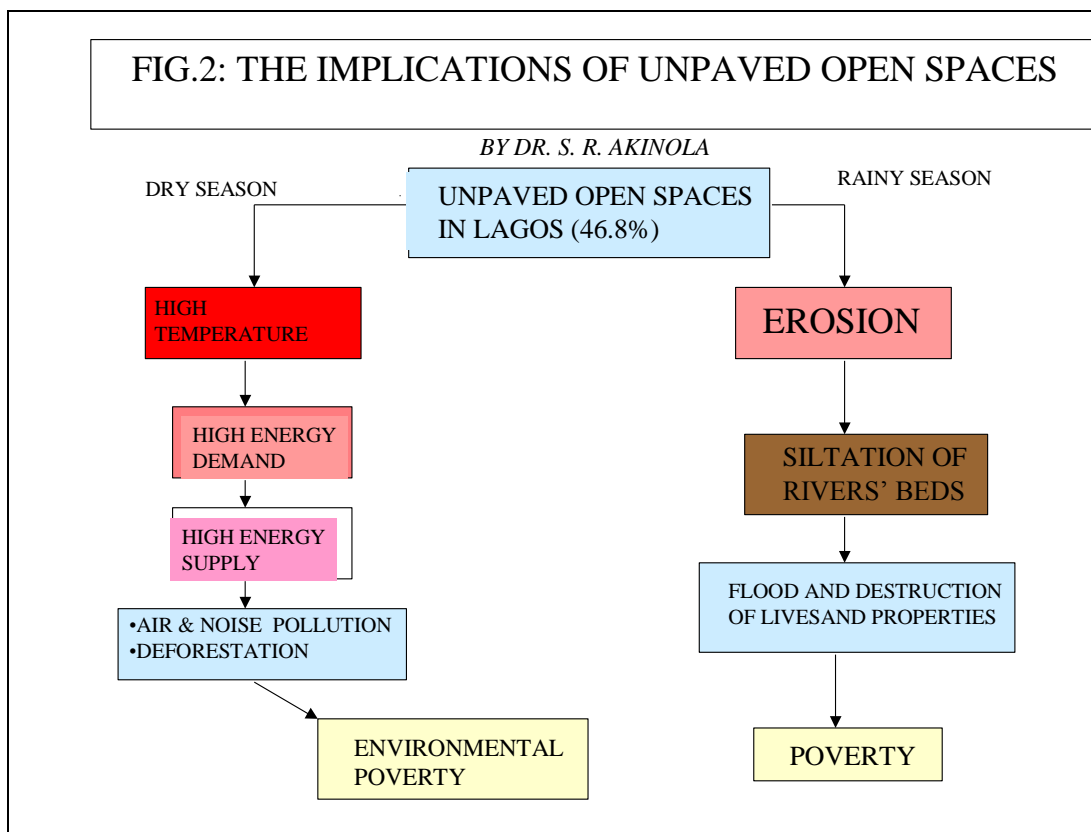
institutional mechanism that can permit collective actions and responses to the problems are put in place.

### OPEN SPACE AND URBAN DEGREENING IN LAGOS

The examination of open spaces in three Local Government Areas in the Lagos metropolis - Gbagada, Mushin and Ikeja shows that large proportion (56.8%) of houses surveyed have all their surroundings paved and this posits a very serious environmental problem for some reasons. This implies increase in environmental temperature because paved surfaces are known for conduction, radiation and reflection of heat and thus increase the ambient temperature with the consequence of creating discomfort, inconvenience, inefficiency and low productivity. In order to address the problem of increased temperature, the artificial cooling system - air conditioning is introduced. The use of air conditioners implies additional demand on electricity supply, which invariably means increasing the capacity of hydro-power and thermal stations by constructing new types and expanding existing ones. Increasing the capacity of electricity supply has degradation potentials in the sense that the construction of dam for hydro-electricity leads to deforestation as nearby land is inundated with water. Deforestation is known for releasing CO<sub>2</sub> to the atmosphere and thus increases global warming and flooding. Similarly, thermal station and generating plant release carbon monoxide which pollutes the environment too (see Figure 1).



Analysis shows that the percentage of developed area per plot is 37.64% which is within the acceptable range of 35.0% to 45.0% (in planning standards). This means that open spaces around the sampled buildings constitute 62.36% on the average. The open spaces are of three types on the basis of their conditions: paved, unpaved and greened open spaces. By calculation, taking all the three spaces together, average area paved constitutes 26.2%, average area unpaved scores 46.8%, average area greened accounts for 27.0%. Given the environmental problems exhibit by paved spaces (storm water rushes down the street unregulated) and that of unpaved spaces (siltation of streams and rivers' beds) the problem of incessant flooding in Lagos is not unlikely to have its origin traced to the ungreened open spaces. These two factors have been identified as causative factors of flooding in urban areas (see Figures 1 and 2).



It needs be emphasised that unpaved spaces are subject to erosional effect within the built-up areas. Foundations of buildings are gradually exposed and weakened (see Plate 1) for an example in Ibadan. The debris and soil washed many times blocked drainages while large quantities of these materials litter the roads. This is environmental poverty. At the end, all these debris are washed down the streams and rivers with the consequence of silting (see Plate 2). The problem of siltation of rivers and streams is complicated in the sense that rivers are susceptible to flooding and dams are affected too. Dredging of dam has financial burden on government in the sense that resources which are meant for other social needs are diverted towards dredging. Also, the impact of flood on people, directly or indirectly, is poverty because properties are destroyed, job opportunities are reduced if not lost. Similarly, both paved and unpaved spaces cause flooding in the sense that paved surfaces allow storm water to rush down the street unregulated and unpaved open spaces give room to erosion and siltation of streams and rivers' beds with the consequence of flooding.



**Plate 1:** The Erosional effect on unpaved and ungreened open space around a building at Labo, Oranyan, Ibadan. The exposed foundation shows that large quantity of top soil had been washed away to the rivers and ocean.





**Plate 2:** Large quantity of soil and other debris dug out of a drainage in Oju-Ore, Ota, a suburb of Lagos, confirming that unpaved and ungreened open space around buildings in the community generated large quantity of soil that were being washed away to the rivers and ocean.

Analysis also shows that 62.4% of plot area is devoted to open space, out of which only 27.0% is greened, meaning that 73.0% of the available open spaces are either paved or unpaved with the problem of heat radiation. The 27.0% green is too small, especially when one considers the benefit of green cover. The implication of this is that the benefits of green cover are lost. Green space serves several purposes especially in urban areas. Such purposes include: local climatic regulation; cycling of water; cycling of oxygen, carbon dioxide and nitrogen; biological filtering of pollutants and screening from noise; regulating hydrology and run-off; and recreation, amenity and public health. Residential environment requires natural cooling system derivable from green cover. Where there is no green cover, artificial cooling system (air conditioning) which increases expenditure and energy consumption is used instead. This invariably increases the budget of individuals and governments while other social functions - health and education - are likely to be jeopardised. Thus poverty sets in, though may be unnoticed initially, the cumulative effect will be glaring in future.

The role of green cover in controlling and regulating flow of water in rainy season is similar to the role of traffic light in controlling and regulating vehicular movements on roads. Without green cover, storm water gathers and rushes down the street which makes drainage to overflow and thus leading to flooding. That is why the author of this paper raises an alarm at a conference as far back as 2000 that Lagos is sinking due to lack of adequate green cover cum sedimentation and rising sea level (Akinola 2000b; Awosika and Folorunso 2000).

Eight years later, Odunuga (2008) discovers that there is a high linear and positive relationship between urban development and flood generation in Lagos. The area inundated by a particular storm event was found to be largely determined by the rainfall intensity. This is further corroborated by Adelekan (2010) when he observes that rainstorms between 1971 and 2005 on Lagos Island have become less frequent but more intense (Adelekan 2010). This high intensity of rainstorms couple with the uncontrolled expansion of the built-up area that are not greened and the

failure to expand and maintain existing stormwater drainage has further increased the risk of flooding in the state (Akinola 2000; Adelekan 2010). As a result, Odunuga (2008) predicts that the impact of climate change on urban flooding will be more severe in the first 20 to 30 years, using year 2003 urbanization driver as the base year, and that peak flow and other related velocity for the 25 years high climate change will increase by an average of 16.1% while inundation area will increase by an average of 2.46%. Similarly, IPCC (2007), envisages that if current efforts to reduce greenhouse gas (GHG) emission were not intensified, it is evident that sea level rise is capable of submerging the whole of the Niger Delta region and Lagos, as well as the outbreak of strange diseases, along with food insecurity.

The attitudinal behavior of people towards open space development is an important study in order to mitigate flooding through urban greenery. In Lagos state, respondents' reasons for paving include: rain water flows easily into the drains; prevents erosion generally; prevents dust and mud on environment thus, promoting neatness during dry and rainy seasons respectively; and makes space easy to maintain. Reasons for not paving include: economic factor in the sense that paving requires money which is scarce in the light of high cost of building materials; and unpaved open spaces provide opportunity for gardening around the house and rearing of domestic animals. Reasons for planting trees/shrubs/grasses include: planting of trees/shrubs/grasses prevents erosion and pollution. It also serves ecological purposes, beautification, play-ground for children and fruits for consumption. Other reasons for planting trees and shrubs are for shade, windbreaker and herbal/medicinal purposes. Reasons for not planting trees/shrubs/grasses include: the environment becomes dirty when leaves of trees and shrubs are shed. It requires constant sweeping and maintenance of the plants, which at times, very expensive. In some cases, plants breed dangerous insects. The question is this: Can the reasons advanced for not greening, though justifiable to these residents, stand the test of flooding as experienced on July 10, 2011?

## **FLOOD DISASTER IN LAGOS**

The July 2011's incident confirmed that flooding in Lagos has reached an alarming stage with the death of at least 20 people and thousands of people driven from their homes. The National Emergency Management Agency (NEMA) describes the rainfall in Lagos as the most devastating floods so far. An on-the-spot assessment by NEMA indicates that the devastation resulted from heavy downpour, blockage of water channels and drainages, indiscriminate dumping of refuse and building of houses along channels (Stearns, July 2011). According to Kalu (July 15, 2011), it rained for 17 hours, while the Nigeria Institute for Oceanography and Marine Research shows that the 264-millimetre rainfall<sup>3</sup> recorded in one day is the volume expected for one full month.

According to ThisDay (15 July 2011), virtually all parts of Lagos State were flooded, forcing residents to stay indoors: Victoria Island, Lekki-Ajah, Abule Egba, Ikeja, Apapa, Oshodi, Ikorodu, Agege, Iyana-Ipaja, Ayobo-Ipaja, Ajegunle, Oregun, Ogba, Orile-Iganmu, Ejigbo, Okokomaiko, Badagry Express way, Jakande Estate, Isolo, Ago-Palace Way, Cele Bus Stop, Lawanson Road, Surulere, Ketu, Mile 2, Satellite Town, FESTAC Town, Mile 12, Agbado, Ijaiye, Aboru, Ojota, Ifako, Ijaiye, Alagbado, Dopemu, Iju, Alapere, Ikotun, Makoko, Bariga, Ajegunle, Epe, Ojo, etc. A number of vehicles and houses were submerged by the flood (Plates 3-5). The Area G Command was flooded almost to the roof and those caught in the flood had to swim. Properties and goods sold by businessmen were damaged.

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<sup>3</sup> <http://www.vanguardngr.com/2011/07/lagos-floods-residents-senate-blame-fashola-jonathan/> (Accessed 16/07/2011).





**Picture 3: A House Almost Submerged at Ajegunle, Lagos**

**Source:** Olasunkanmi Akoni & Monsur Olowoapejo

<http://www.vanguardngr.com/2010/10/flood-disaster-lagos-evacuates-681-residents/> (Accessed 16/07/2011).



**Picture 4: A man brought out dead from a canal in Dopemu, Lagos.**

**Source:** <http://pmnewsnigeria.com/2011/07/11/in-pictures-floods-wreak-havoc-in-lagos/> (Accessed 13/07/2011).



**Picture 6: A Woman Abandoned her Car for fear being drawn**

**Source:** NIGERIAFILMS.COM

<http://www.nigeriafilms.com/news/12653/34/eko-oni-baje-olagos-flooding-photos.html>

(Accessed 15/07/2011).

## **FLOOD DISASTER IN IBADAN**

The seven and a half hours of rainfall witnessed in Ibadan from the evening of Friday, 26th August 2011 to the early hours of Saturday, 27th August, 2011, caused serious flooding that devastated most of the city and its environs. Over one hundred lives were reportedly lost with property damage estimated in billions of naira. The major areas affected were Odo-Ona, Odo-Ona Elewe, Orogun, Agbowo, Apata, Ajibode, University of Ibadan, Ogbere-Babanla, Ogbere Moradeyo, Onipepeye and Eleyele Dam/ Water Works. The total length of streams and rivers found in the eleven local government areas is 3,168.64 km (OYSG, 2011:6).

The immediate anthropogenic and hydrological causes of flooding in Ibadan have been attributed mainly to land use factors. Notable among these factors is the indiscriminate and relentless construction of buildings on flood plains with 26,553 buildings found within the statutory set-backs of various streams and rivers and 2,105 buildings that were flooded by the heavy downpour of 26<sup>th</sup> August 2011. Deforestation has been identified as another contributory factor to the flooding problem in Ibadan. The destruction of natural forests (as in the Eleyele-Apete axis where the teak plantation buffering the R. Ona has almost been totally depleted) has aided flooding in Ibadan metropolis due to the reduction of the infiltration and retention capacity of these areas (OYSG, 2011: 7)

The indiscriminate dumping of solid waste in streams and rivers is a common practice in Ibadan metropolis. These wastes hinder the free flow of water downstream. The resultant blockage of the river beds and drainage channels with refuse and solid wastes is the most important cause of aggravated flooding along the channels of R. Ogunpa and R. Kudeti, and indeed most areas in Ibadan metropolis. There are urban design features that have also contributed to the flooding problems such as reduction in urban green space, increased density of development and increased barriers to flood flows, such as road embankments, narrow bridges and culverts.

The negative effects of flooding can be multi-dimensional and inflicting long-term “injuries” on lives and properties in affected areas. Typical effects include loss of lives, property and means of livelihoods, severe social dislocations, as well as the destruction of the environment, including wild life sanctuary. Flooding also precipitates environmental health hazards, such as the outbreak of diseases, arising from drinking surface water and well water which have been polluted as a result of flooding. In the absence of timely intervention by the government and relief agencies, the effects of flooding can be very traumatic for the victims. During the recent flooding, some residents were trapped by floods and could not leave their houses for several days until the floodwater receded. Many residents lost their loved ones and their entire means of livelihood to the flooding. Furthermore, the disaster caused a lot of damage to urban infrastructures such as roads, culverts and bridges. For instance, the Eleyele Waterworks was badly affected with most of the treatment works covered by water. The spillway of the waterworks was also badly damaged (OYSG, 2011:10). The University of Ibadan suffered huge infrastructural damage with loss in property worth US\$65 million. The university’s teaching and research farm, with different species of fish valued at about \$19 million, books estimated to be worth about \$13million, etc. were destroyed (Makoni, 2011).

### **Diagnosis of Current Strategies**

As a result, the Lagos State Government decided on demolition of all illegal structures sitting on canals and drainage channels. This is a welcome development. However, lack of good green cover will still engender flooding in the future. This is because green space serves the purpose of regulating hydrology and run-off, cycling of water, local climatic regulation, cycling of oxygen and carbon dioxide, etc. Considering the benefits of green cover, urban greenery is a short-cut to reduction of environmental degradation and flooding; increase in productivity, welfare of citizens and aesthetic value.

There seems to be a missing link in the operation of LAWMA and the people of Lagos State, which is one of the important tasks this paper is set out to address. There is the need for the adoption

of some strategies such as information networking (Akinola 2008p, 2009b) restructuring the public sphere (Akinola 2010a, 2011a) and the formation of Self-Governing Community Assembly (SGCA) for synergy between and amongst the stakeholders in waste management in the state. This would help in mainstreaming the citizens in decision making and implementation of policies through traducture (wa Goro 2007; Akinola 2011h).

Planting of trees and grasses on public space (roadside) by the Lagos State Government is a good step in the right direction. However, considering the percentage of such space to the overall geography of the state, a lot still needs to be done in residential area, commercial, industrial, etc. That is why this paper should be given an urgent attention so that the neglected but pertinent areas to flood mitigation can be quickly addressed as early as possible. The construction of French Drain along the beach and the Lagos Atlantic City<sup>4</sup> project were expected to provide a permanent solution to the problem of water surge. The Lagos Atlantic City project raised the wall of the city as high as 10 metres to prevent overflow (Alao and Olumide 2009). These strategies should be strengthened by greenery system that would regulate and control the rate of flow of storm water.

At the level of federal government, there is the question that centres on the status of Climate Change Commission, under which Ecological Funds are to be disbursed to the affected areas within the country. The 17<sup>th</sup> conference of parties (COP17) to the United Nations framework Convention for climate change held in Durban, South Africa from November 28 to December 9, 2011, sidelined Nigeria's participation as the country lack Climate Change Commission. Nigeria's participation remained at the ministry level with no legal and structural commitment for implementation. This is because a bill<sup>5</sup> intended to bear the Climate Change Commission is yet to be assented by the president. As at July 2012, the bill is yet to be signed.

According to the bill, the Commission will comprise of the departments of Multilateral and Bilateral Programmes, Statistics, Planning, Research and Policies, Administration and Services, Vulnerability, Adaptation and Mitigation, Monitoring and Regulation. Other responsibilities of the Commission include strengthening and coordinating resources, policies and actions on climate change, such as developing a national strategy for the reduction of Green House Gas emissions and advising the Federal Government on climate change policies and priorities in areas such as renewable energy, technology transfer and transport management. The bill also stipulates that 10 percent of Ecological Funds and certain percentage of funds from the Consolidated Revenue Account will be given to the Commission for the discharge of its duties (Umejei 2011). All these are critical issues that are beyond the capability of a ministry. A commission is needed.

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<sup>4</sup> The recent flooding of Lagos on Sunday, July 10, 2011 has made observers and analysts to question the viability of the ambitious Eko Atlantic City project. Although the state government claims that the project will have a positive environmental impact since it aims to restore the land lost to coastal erosion over the last 60 years and provide a permanent solution to the problem, the recent deluge that submerged many parts of Lagos questions such assertions. Artificially restricting the surge of the Atlantic Ocean would have a disastrous and catastrophic impact on the Lagos environs. The state should learn from the recent tsunami in Japan, which claimed thousands of lives and property worth billions of dollars that could take five years or more to rebuild. The failure of successive governments to deal with the problem of perennial flooding in Lagos State and other parts of the country buttresses his point. Others have viewed the Eko Atlantic City project as a waiting disaster on the fact that lands reclaimed from the sea are susceptible to about 95 per cent probability of an environmental disaster. The unpredictability of nature is well documented in history, climate change has even made the world's weather more unpredictable. Although land reclamation is being done all around the world, the recent Lagos flood and predictions that the whole of Lagos could go under water in the next few years seem to have washed away any convictions about the viability of the ambitious Eko Atlantic City project (Umukoro 2011).

<sup>5</sup> The Nigerian Senate had passed the bill to establish the National Climate Change Commission on July 22, 2009 but lack of assent on the bill will prevent Nigeria from accessing the climate fund of \$200 billion that industrialised nations had agreed to make available annually by 2020 at the COP 16 in Cancun, Mexico (Umejei 2011).

In the light of recent developments, Nigeria's plummeting prominence in climate change negotiation erodes her position as a leading voice seeking justice for the African continent. For instance, recent indications show that out of over 200 negotiators appointed as Africa's representatives under the platform of the African Group, only one Nigerian was acknowledged as against 29 for South Africa; 18 for DR Congo; 8 for Senegal; 7 for Algeria; 7 for Tanzania; 6 for Egypt; 6 for Gabon; 6 for Ghana; 5 for Sudan; 5 for Kenya; etc. Similarly, the recently constituted transitional committee charged to design the Green Climate Fund which had members from eight African countries excluded Nigeria but included South Africa, Gabon, Egypt, Ethiopia, Morocco, DR Congo, Burkina Faso and Zambia (Simire and Abutu 2011).

Considering the importance of the Commission, the LASG should make pressure to bear on the federal government for full operation of the Commission where the state can get funds to address flooding problems in the state. In order to complement good channelisation and effective waste management that Lagos State Government is driving, a new approach to urban planning/governance and open space development should be adopted. In view of realistic prediction by researchers that future flooding will be more devastating, this paper attempts at proffering possible solution to mitigate flooding and avert destruction of lives and property. This is why the next section considers it imperative to advance some suggestions on the way forward by designing a blueprint for polycentric planning, new urban governmentality and urban greenery in Lagos and Ibadan.

## **REDUCING FLOODING THROUGH POLYCENTRIC PLANNING, NEW URBAN GOVERNMENTALITY AND URBAN GREENERY STRATEGY IN NIGERIAN CITIES**

Polycentric planning can be defined as the process of ordering the use of physical, human and institutional resources as well as engaging the citizens in contractual relations with the public authority (Akinola 2009b:83, 2010a:58, 2011a:7). Polycentric planning relate with polycentric governance. Polycentric governance system emphasises high level of public accountability, locality and the control of community affairs by the people (Olowu 1999:213). While polycentric planning is a process, polycentric governance is a system that takes effect after planning and implementation of any project (Akinola 2011m).

The present exogenous urban governance system that is elite driven as being practiced in developed democracies is not applicable to African/Nigerian contexts simply because the majority of Africans/Nigerians operate in informal sector of economy, where centralized systems of governance unable to capture. Therefore, the adoption of polycentric planning for urban governance will produce a new urban governmentality by contributing to the success of democratic life via democratic association at the local level for urban citizens. Effective polycentric planning and self-governments can act as a check, under certain circumstance, on the excesses of the central government as well as provide greater opportunities for accountable government. Self-governing institutions (SGIs) mobilize substantial efforts and resources from the local people to complement the efforts of the central government.

Though there is a growing awareness of the need to strengthen community institutions which have existed and have facilitated self-reliant development at the local level, these institutions in Nigeria exist at grassroots without official connection with the state-based institutions (Akinola 2005d, 2008b). If these institutions are viable (though not perfect), the question then is how do we connect them to the formal government structure? It then becomes necessary to evolve and design appropriate institutional framework that will streamline the governing techniques of both the government and the people towards flood mitigation in a polycentric manner.

Analysis and modeling appropriate to the vision via new institutional arrangements for implementation are also very crucial for mitigating flooding in Lagos state. The new institutional mechanism will enable Lagos state to reposition urban managers to deliver inclusive environmental

policies and strategies as well as effective waste management system on the one hand and evolve appropriate partnership with some states on rural industrialization and employment generation programmes that could depopulate Lagos and reverse rural-urban migration through de-urbanisation, de-migration and re-migration on the other hand. The paper considers it imperative the application of pragmatic and problem-solving home-grown models to challenges of flooding in Lagos.

### **Polycentric Planning and Urban Greenery Strategy (PGUGryS)**

Polycentric Planning and Urban Greenery Strategy is a system of human cooperation. Since society is a system of human cooperation, people in any society should collectively relate to and deal with their exogenous variables in order to subdue environmental challenges and flooding. Exogenous variables are those conditions that affect human livelihoods and which humans have to work upon through appropriate planning and institutional arrangements to better their conditions of existence. However, there are some fundamental imperatives of collective action within development arena. These are collegiality, mutual trust, reciprocity and shared understanding. It is the realization of these imperatives through constitutional reforms, effective planning and institutional arrangements that can enable the people and their leaders to work together to achieve meaningful progress (Akinola 2010a, 2011a).

Cooperation requires deliberation. That is why deliberative democracy is considered more appropriate for Africa (Akinola 2011a). For example, one of the proud inheritances of South Africa's democracy is public dialogue in the form of community forums, negotiations, and *imbizo*<sup>6</sup>. Community forums have been part of social movements in the fight against both apartheid and post-apartheid inequalities. Negotiations proudly characterized the transition to democracy which is based on principles of nondiscrimination (Hartslief 2005:1). The equivalent of *imbizo* among the Yoruba of Western Nigeria is *igbimo ilu* (town court of legislators), *opuwari* among the Ijaw in Bayelsa State and *mbogho* among the Efik and Ibibio of Cross River and Akwa Ibom States of Nigeria. It is high time Nigerians looked back in retrospect to learn from their roots by harnessing certain self-governing principles that are inherent in their cultural/traditional heritage to address urban challenges.

If we agree that institutions matter in terms of their influence on cooperation, then self-organizing and self-governing arrangements that the peoples of Africa have adopted in cooperating mutually in responding to their common problems are imperatives as the first condition to be met for the attainment of good urban governance and viable democracies. Recent indications support the fact that the peoples of Nigeria through self-organizing and self-governing arrangements have been responding appropriately to the needs and aspirations of the citizenry. By exploring pre-colonial governance heritage and practices elsewhere, the people have been able to respond to social challenges that the state has effectively dodged over the years. Considering the good performance of the local people through self-governing institutions across Nigeria are capable of cooperating with one another to organize people-oriented urban governance (see Akinola, 2000, 2005d, 2007a,f, 2008b, 2009a,b, 2010a,i, 2011a,b,d, 2012a,b).

It is this type of self-governing and self-organising arrangement that can be integrated into the formal system of government in Lagos and Ibadan. This, invariably, would lead to effective cooperation and deliberation between and among public officials and citizens at community/ward

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<sup>6</sup> *Imbizo* is a word from the Zulu language in South Africa. It means a "gathering" for the purpose of discussing important matters within a group or community. Its ultimate purpose is to ensure participation of members in the process of conceptualising, making and executing decisions. The *imbizo*, in its traditional form, has constituted an important aspect of the indigenous African political system for many centuries, especially in Southern Africa (Hartslief, 2005:1).

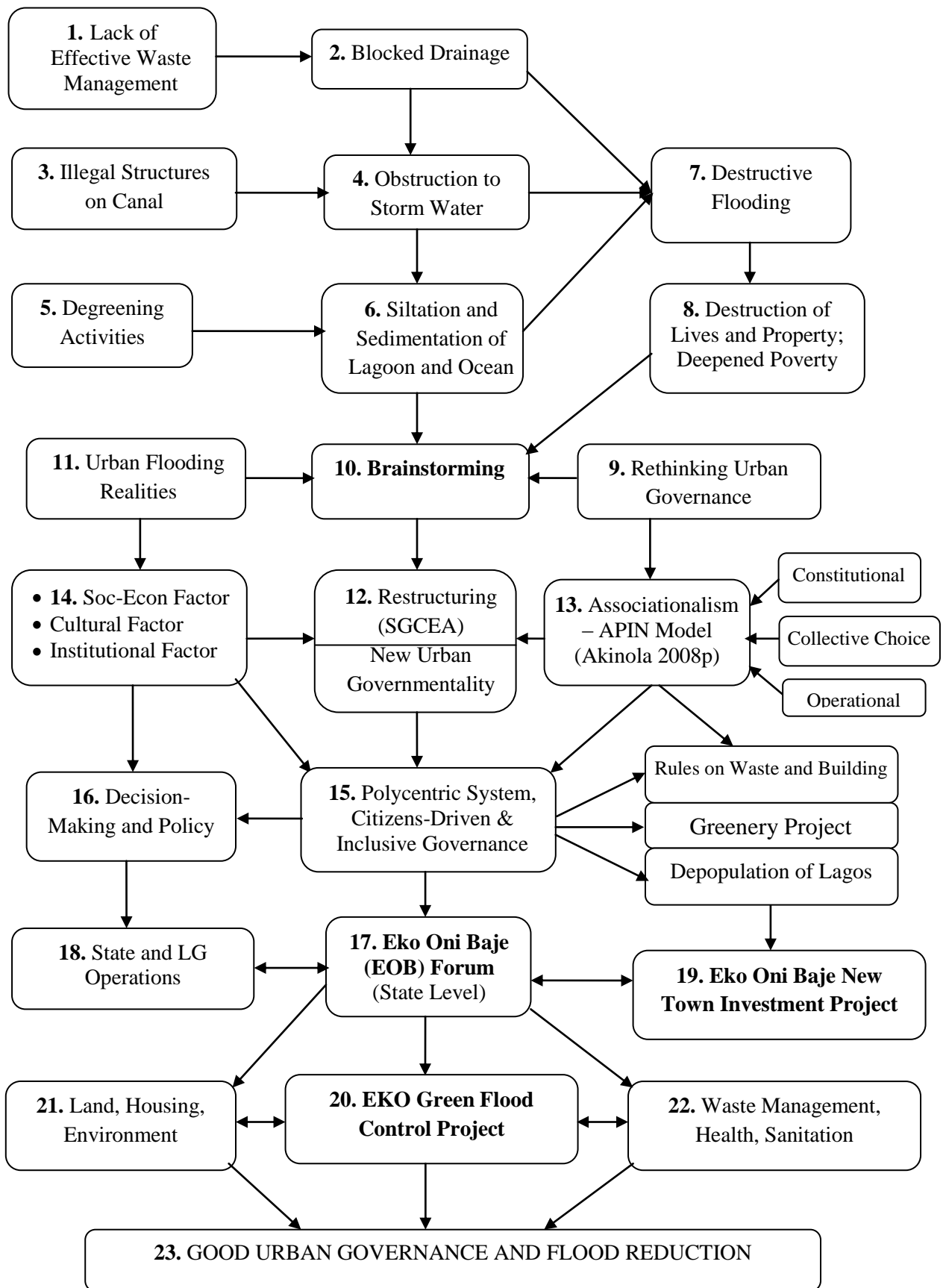
level, thereby eliminating gaps between the two groups. The application of Polycentric Planning and Urban Greenery Strategy (PPUGryS) in Lagos and Ibadan would enable a reduction of vulnerability by mitigating flooding. Using PPUGryS, an African Polycentric Urban Greenery Model (APUGryM) is designed.

### **African Polycentric Urban Greenery Model (APUGryM)**

In order to enable urban managers in Lagos effectively address the problem of flooding, this paper designs an African Polycentric Urban Greenery Model (APUGryM). The APUGryM is diagrammatized in Fig. 3. The first part of the model (Nos. 1-8) displays the problematics of urbanization, driven by centralised, monocentric and monocratic systems of governance occasioned by structurally-defective institutional arrangement. This has resulted into lack of effective waste management (no. 1), erection of illegal structures on carnal and channels (no. 3) and degreening activities that remove green cover as was the case in *Agala* forest in Ibadan in the mid-1990s during the kerosene scarcity (no. 5). All these culminate into flooding during heavy downpour that result into destruction of lives, property and thus deepening poverty (no. 8). The problem of centralised system of governance is that citizens have no input into decision, planning, execution, monitoring, evaluation and assessment of public goods and services, especially from conception to implementation. Exclusion, in most cases, leads citizens to adopt survival strategies that may not be consistent with ideal societal standard.

The second part of the model (Nos. 9-23) displays the way forward, especially on the role of Nigerian scholars and public officials in rethinking urban governance in averting flooding by charting possible courses of actions on how urban managers can work with citizens in synergy. Rethinking urban governance (no. 9) should be done by scholars, public officials and representatives of interest groups, NGOs in a brainstorming conference (no. 10). The rethinking requires the imperatives of Lagos flooding realities to be factored into a new urban governmentality. Flooding realities should be viewed and analysed via exogenous variables (socio-economic, cultural and institutional factors) (no. 14). The paradigm shift in governance demands a new institutional arrangement through restructuring whereby the efforts of the stakeholders in the public terrains – politicians, bureaucrats, technocrats, scholars, NGOs, youth, unemployed persons, self-governing institutions, etc. – are synergized. Since political factor determines the operation of other sectors of the economy, restructuring the public sphere becomes central to address flooding and other challenges in Lagos (see Akinola 2011a).





**Fig. 3: African Polycentric Urban Greenery Model (APUGryM)**



At the heart of restructuring the public sphere is the operation of Self-Governing Community Environmental Assembly (SGCEA). The stakeholders/participants would operate using rules that are crafted by members at the SGCEA. Rule crafting takes place through associationalism at three levels – constitutional, collective choice and operational. At the constitutional level lies the system that determines how rules on flood control are made and can be modified. At the heart of effective flood control is the imperativeness of ‘constitutional’ reform which can be accomplished through pragmatic experience. The adoption of polycentric strategy could avail the citizens the opportunities to dialogue in community assembly and jointly take decisions on urban greenery, environmental health and depopulation of Lagos. At the collective choice level, rules that define and constrain the actions of individuals and citizens in urban greenery and environmental health matters have to be established. At the operational level, concrete actions on greenery and flood control have to be undertaken by those individuals most directly affected, especially public officials and community members (see Akinola 2010a, 2011a).

### **Self-Governing Community Environmental Assembly (SGCEA), Civic Enlightenment and Citizens’ Responsibilities/Tasks**

The SGCEA should be patterned after *imbizo*, *igbimo ilu*, *opuwari* and *mbogho* but modified to include representatives of governments with their agencies, higher institutions, community institutions, occupational groups, women groups, youth, etc.). Since SGCEA is a multi-tasks assembly, one of its operations will have to do with education and enlightenment of citizens so that public officials and the people operate within shared communities of understanding. This is because people are the human resource for the supply of physical labour, technical and professional skills which are germane to effective and efficient planning and implementation of development policies, programmes and public services and flood mitigation.

In order to avert flooding in Lagos and Ibadan, some fundamental questions need to be addressed: (1) What methods were used in mitigating flooding before and currently being used now? (2) What are the strengths and weaknesses of those methods? (3) Were(are) the methods effective? If not, why were(are) they not effective? (4) What should governments do in terms of urban greenery, environmental health and depopulation of Lagos and how should they do it? (5) What can people do alone without government intervention in flood control? (6) What can people do in tandem with government in flood control? (7) How can people handle these issues in numbers 5 to 6? (8) What should be the role of Lagosians in crafting and enforcing environmental rules as well as rule infractions?

Both leaders and citizens need new orientations, which require some training at the level of SGCEA. The leaders need new orientation in community governance and management of community affairs(as proposed in AERD – Akinola 2008p:192-193; 2010g), while citizens need to be prepared for regular dialogues with their leaders. Community-led initiatives that draw on the creativity and capacity of local people to take control of their change processes must be integrated into the proposed Lagos greenery programme. Conscious effort must be made to recognize and respect local dynamics in implementing proposed programmes on urban greenery, environmental health and depopulation of Lagos. It is important to mobilize residents to engage government and city authorities in exploring alternatives for averting future flooding.

The first task before the assembly is to share views and values of all the groups/interests. Among the issues to be discussed are: the importance of environmental resources and green cover to all the interest groups; the implications of environmental degradation; the contributions of each group towards resources regeneration, afforestation and greening; and tasks and responsibilities that each group should carry out for effective environmental governance.

Two major tools of SGCEA are Public Complaints Commission for Environment (PCCE) and Environmental Cost Internalization (ECI). These tools will ensure stakeholders to jointly take decisions, monitor industrial activities and ensure that industries comply with Environmental Impact Assessment (EIA) standards. The current practice whereby industries pay for pollution should be sustained but monitoring should be more effective. The process of implementing “‘polluters pay legislation’ and ‘health and welfare of citizens’” is in six stages as discussed elsewhere (Akinola 2008q:66-69). Then group representatives would then pass decisions to their members and each group would have to use different methods (as agreed among its members) in accomplishing tasks assigned it. This is well demonstrated by APIN. The emerging new institutional arrangement would produce a new urban governmentality that is polycentric, citizens driven and inclusive (no. 15). This would reflect new ways of operations by state and local government managers in decision making and policy formulation on environmentalism and flood mitigation (nos. 16 & 18).

Adopting associationalism through African Polycentric Information Networking (APIN) (Akinola 2008p), the LASG in conjunction with SGCEA should organize EKO/IBADAN ONI BAJE forum (no. 17) at state level where key decisions would be taken on EKO/IBADAN Green Flood Control Project (no. 20), depopulation of Lagos through EKO/IBADAN ONI BAJE New Town Investment Project (no. 19), land, housing, environmental management (no. 21), waste management, health and sanitation (no. 22). A local example using stone to prevent erosion was captured in Ibadan (see Plate 6).

When citizens are able to realize that they can and should take full responsibilities in shaping and re-shaping their environment and urban development issues to suit their daily aspirations and yearnings through active and constructive interjections, then shared communities of understanding would be established. This would provide fertile ground for the adoption of successful practices elsewhere. At the end of the day, Lagos State would experience good urban governance and flood mitigation (no. 23). Other models and strategies that can help in actualizing flood mitigation programme are: (i) African Polycentric Sustainable Environment Model (APSEM) (Akinola 2009b:96) (ii) African Public Sphere Restructuring Model (APSRM) (Akinola 2010a, 2011a); (iii) African Polycentric Information Networking (APIN) (Akinola 2009b:94); and (iv) African Polycentric Forest Management Model (APFMM) (Akinola 2007i:126-127).

The application of these models would lead to sustainable environmental development. However, there is the need to set up a feedback system called cybernetics that would help in refining the operational strategies. This would be carried out from time to time (from 1<sup>st</sup> level to n<sup>th</sup> level). It is believed that if these suggestions are taken into consideration, a responsive policy on environmentalism would emerge and a shared community of understanding among the stakeholders necessary for good urban governance would lay the foundation for sustainable environmental management that would prevent flooding in Lagos state.



**Plate 6:** Local creativity in preventing further erosional impact on unpaved and ungreened open space around a building at Labo, Oranyan, Ibadan. Big boulders and rocks were used for this prevention. Consequently, green cover serves as prevention in addition to the stone used.

## **IMPLEMENTATION PROCESS FOR REDUCING VULNERABILITY AND FLOODING THROUGH POLYCENTRIC URBAN GREENERY STRATEGY IN LAGOS STATE**

This section focuses on how Lagos State Government (LASG) could address the problems of flooding through the implementation of Polycentric Governance and Urban Greenery Strategy (PGUGryS) by applying APUGryM, APSEM and APFMM. This would enable governments and the people to release their potentials in meeting the present and future needs without causing destructive flooding. The implementation of this paper is in two parts. The first part is at the state level, while the second part is at the LG/community level/ward. Though attention is focused on Lagos, all the issues raised are applicable to Ibadan.

### **Implementation at the state level – Eko Oni Baje Forum**

At the state level, the LASG should organize a programme tagged, EKO ONI BAJE Forum (EOBF) that would involve public officials, scholars in relevant fields and representatives of all SGIs and interests groups within the 20 LGs and 37 LCDAs. EOBF should be held bi-annually to review issues of concerns. The project should bring together three (3) representatives of all the existing interest groups at the state level. The result of experiment on application of polycentric privatization in Irepodun Investment Cooperation, in Irepodun LGA, Osun State, Nigeria should be regarded as a new way of thinking through our problems (see Akinola 2007f, 2010i). In order to make EOBF touch base, attention should be directed towards indigenous and endogenous institutions that Lagosians have evolved in coping with the problems of daily existence. Interestingly, all these institutions have their working rules already, thus confirming the existence of foundations on which EOBF can be operated.

These people-oriented institutions and public officials (politicians and bureaucrats) must sit together and discuss the nitty gritty of flooding. The two groups should of necessity start from ‘constitutional’ level through collective action level to operational level. At constitutional level, designs of flood control programmes are laid down in an open ended fashion and intermittently contested by participants at various layers of authorities – state, local, community, ward and associational levels. At collective action level, activities on flood control programmes are decided by the participants within development action arena, while flood control activities happen at operational level. During EOBF, extensive discussion should be held and decision should be taken on specific issues relating to environment and flooding (as listed elsewhere).

### **Depopulation of Lagos through De-urbanisation**

The current situation in Lagos demands that the LASG should explore several alternatives, options and strategies. In an attempt to depopulate Lagos state and in view of the fact that Lagos State has limited land, the state government could embark on New Town Development for food security and employment generation programmes outside its geographical area by liaising with interested states (i.e. host states) that have land and willing to collaborate. This is an investment opportunity for the cooperating states. Incidentally, the Ministry of Agriculture and Co-operatives<sup>7</sup> in Lagos State is already thinking in this direction to grow rice outside the state. In the thinking of this paper, this arrangement would be based on five conditions (as discussed elsewhere).

The Implementation of New Town Development and polycentric privatization programmes for food security and employment generation should be patterned after global successful practices whereby workers were constituted into cooperative and were subjected to better pay, shorter-working hours and better housing.

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<sup>7</sup> “Nigeria’s Lagos Region May Acquire Land Outside State for Rice Cultivation.” <http://www.bloomberg.com/news/2011-07-26/nigeria-s-lagos-state-may-acquire-land-to-grow-rice-consultant-says.html> (Accessed 26/07/2011).

## **Implementation Process for EKO Green Flood Control at Local Government/Ward Level in Lagos State**

In order to address the problems of illegal structure and dumping of waste in drainage, innovative approach, based on new knowledge, should be adopted. The methodology proposed for the implementation of PGUGryS embraces direct contact and (working in) collaboration with the people at the local/ward level through the various groups, interests and associations/organizations within local communities in an integrated fashion. As done at the state level, attention should be directed towards indigenous and endogenous institutions that the people have evolved in coping with the problems of daily existence. All property owners in the state should be involved in a polycentric manner. The implementation strategy of the proposed project is highlighted under nine (9) stages (as discussed elsewhere).

## **CONCLUSION**

The paper concludes that the gaps and neglected areas by researchers and policy makers in attempts to address the problems of flooding in Lagos State constitute a critical lacuna and omission that may thwart all other efforts being made in mitigating flooding in the state. Previous flooding and the recent ones have been attributed to heavy downpour, blockage of water channels and drainages, indiscriminate dumping of refuse and building of houses along channels. Areas that are neglected but pertinent to flood mitigation are: (1) degreening activities; (2) paved open spaces that accentuate storm water; and (3) unpaved surface that generate debris and silts that cause siltation and sedimentation of Atlantic Ocean and Lagoon with the consequence of rising sea level and coastal flooding. As more and more land is urbanised, and trees and grasses are replaced by asphalt and concrete, rainwater has less chance to be absorbed. Thus, storm water rushes down the streets while areas that were never flooded are now routinely under water across the state.

There is a consensus among scholars and researchers that Lagos is sinking due to uncontrolled expansion of the built-up area, lack of adequate green cover, increase in sedimentation and rising sea level, and high intensity of rainstorms. In addition, the failure to expand and maintain existing stormwater drainage has further increased the risk of flooding in the state. As a result, the impact of climate change on Lagos flooding will be more severe and devastating in the first 20 to 30 years.

In order to complement good channelisation and effective waste management in Lagos and Ibadan, a new approach to urban planning/governance and open space development should be adopted. The people should be educated and enlightened on the importance of green cover and be motivated to green their environment. The contention is that environmental governance is a priority for Nigerian and Lagos State Governments. The Federal Government should be involved in this exercise because Lagos, as a coastal city, is at the receiving end of debris from the hinterlands (through erosion and rivers) that are deposited in the Atlantic Ocean and Lagoon, which causes siltation and sedimentation and consequently, rising sea level. In other words, other parts of the country are also contributing to rising sea level and coastal flooding in Lagos State. Through polycentric arrangement and institutional mechanism, the stakeholders should operate in synergy to understand the importance and the need for environmental greenery and conversely, the adverse effects of degreening the environment. It is the responsibility of the governments to fashion policy that will encourage the people to implement environmental friendly decisions. Urban managers both at the State and Local Government Levels in Lagos and Ibadan must be ready to adopt more realistic and pragmatic strategies in addressing the current urban congestion and flooding challenges.

Using Polycentric Governance and Urban Greenery Strategy (PGUGryS), this paper charts possible courses of actions that Lagos State Government could take in addressing environmental degradation and the challenge of flooding in the State. Consequently, the paper designs an African Polycentric Urban Greenery Model (APUGryM), which is problem-solving and pragmatic.

APUGryM is designed to improve synergy between scholars, public officials and citizens in urban greenery with the purpose of increasing urban green cover so as to: (a) allows percolation of rain water and regulate the flow of storm water instead of rushing down the streets and makes drainage to overflow, and (b) reduce erosion, debris and silts that cause siltation and sedimentation of Atlantic Ocean and Lagoon that are noted for rising sea level and coastal flooding. Other models that strengthen APUGryM are: (1) African Polycentric Sustainable Environment Model (APSEM), (2) African Public Sphere Restructuring Model (APSRM), (3) African Polycentric Information Networking (APIN), and (4) African Polycentric Forest Management Model (APFMM). In addition, the Lagos State Government could embark upon depopulation of the city through de-urbanisation, polycentric privatization, de-migration and re-migration.

Implementation of this paper is in two parts. The first part is at the level of LASG while the second part is at the level of LG/community across the state. The implementation is proposed to commence with EKO ONI BAJE Forum at both the state and local/ward levels by bringing together stakeholders – public officials, scholars, researchers in relevant fields and representatives of all self-governing institutions as well as all interests groups – to take key decisions on EKO Green Flood Control Project, depopulation of Lagos through EKO ONI BAJE New Town Investment Project, land and housing, environmental management, waste management, health and sanitation. Operational actions take place at LG/ward level with EKO ONI BAJE forum at each LG.

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